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Influence of Nutritional Factors on the Development of Ovarian Cysts in Dairy Cows at a farm in northwest Romania

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Abstract: Cystic ovarian disease (COD) is a major cause of reduced fertility in high-yielding dairy cows. Its occurrence is closely linked to nutritional and metabolic imbalances. This study evaluated the relationship between diet composition and COD incidence in 579 cows examined by transrectal ultrasonography. Feed and milk samples were analyzed monthly for Acid Detergent Fiber (ADF), Neutral Detergent Fiber (NDF), Dry Matter (DM), Crude Protein (CP), and Milk Urea Nitrogen (MUN). A marked decrease in ADF and NDF in August–September, combined with high DM values and low MUN, indicated reduced rumen activity and a deficit of metabolizable protein. These conditions coincided with the highest COD incidence (15.5% in September). The results suggest that low fiber intake and protein-energy imbalance may induce negative energy balance (NEB), disrupting hormonal regulation and promoting ovarian cyst formation.

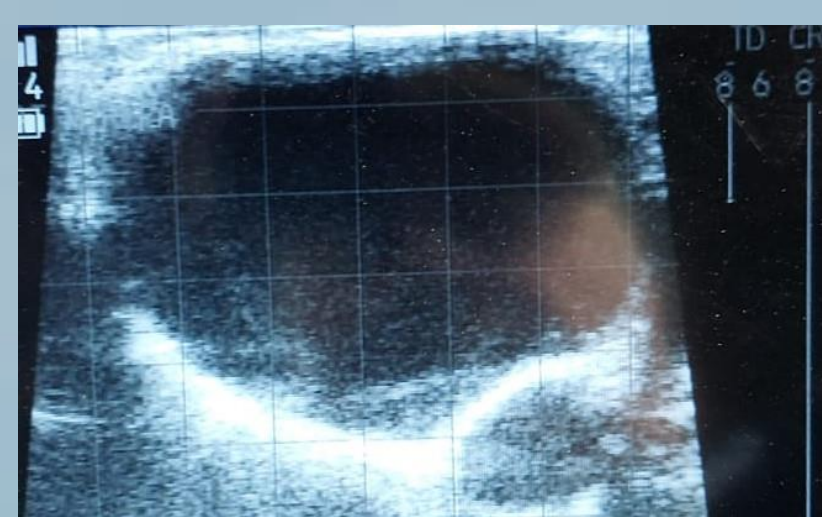
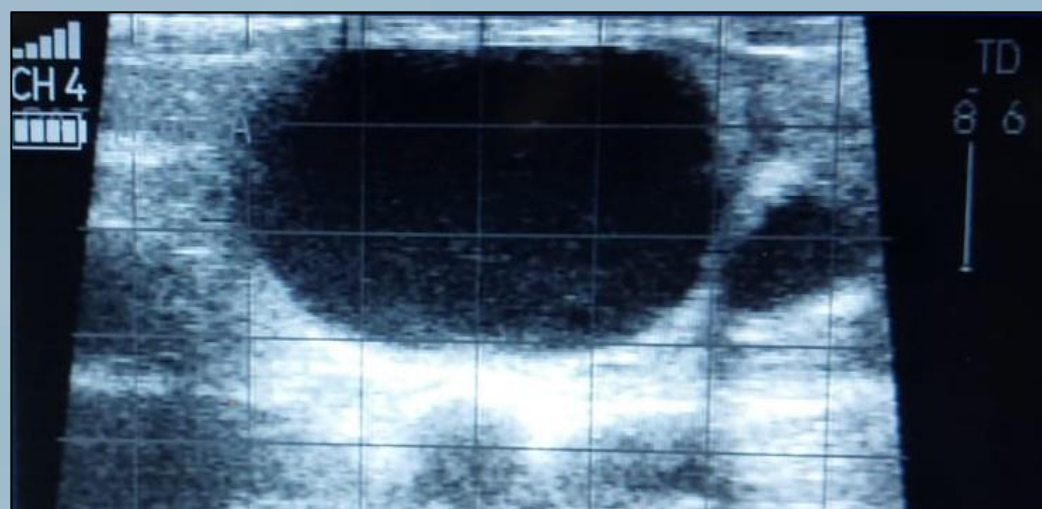
Keywords: cystic ovarian disease; negative energy balance; crude protein; acid detergent fiber; neutral detergent fiber

Introduction: Cystic ovarian disease (COD) is a major reproductive disorder in dairy cows, reducing fertility and productivity, especially in Holsteins 30–60 days postpartum. It is associated with dysfunction of the hypothalamic–pituitary–ovarian axis and influenced by metabolic and nutritional stress. Energy–protein imbalances and negative energy balance (NEB) disrupt hormones and follicular development. This study explores the relationship between nutrition and COD in a high-yielding dairy herd.

Nutrition → Energy balance → Hormonal status → Ovarian function
→ **Cyst formation**

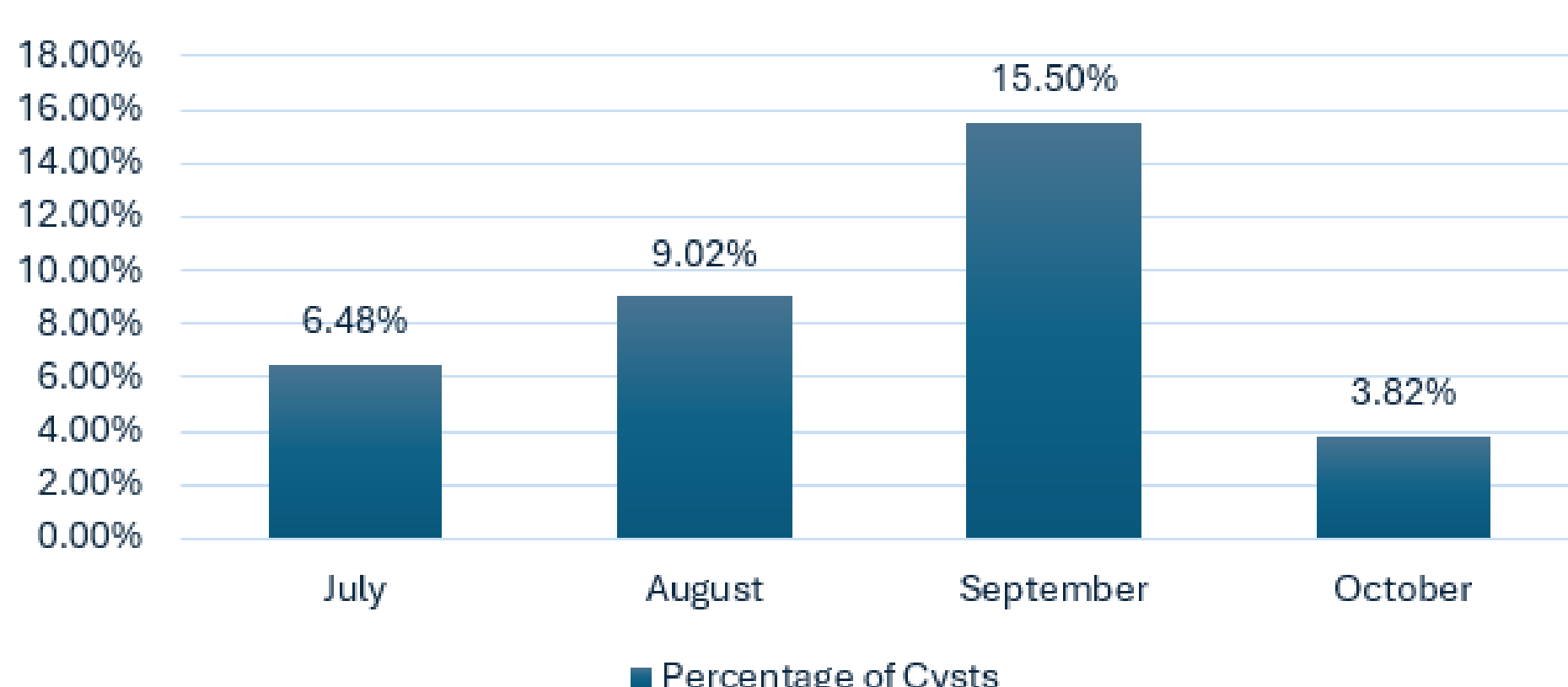
Materials and methods: The study, conducted from July to October on a dairy farm in northwest Romania, included 579 Holstein and Red Holstein cows (≈30 L milk/day). Cows >30 days postpartum or with reproductive disorders were examined by transrectal ultrasonography. COD was diagnosed based on ovarian structures >2.5 cm and reproductive history. Monthly analyses assessed cyst incidence, feed composition (ADF, NDF, CP, DM), and milk urea nitrogen (MUN) to evaluate nutritional balance.

Results and discussions:



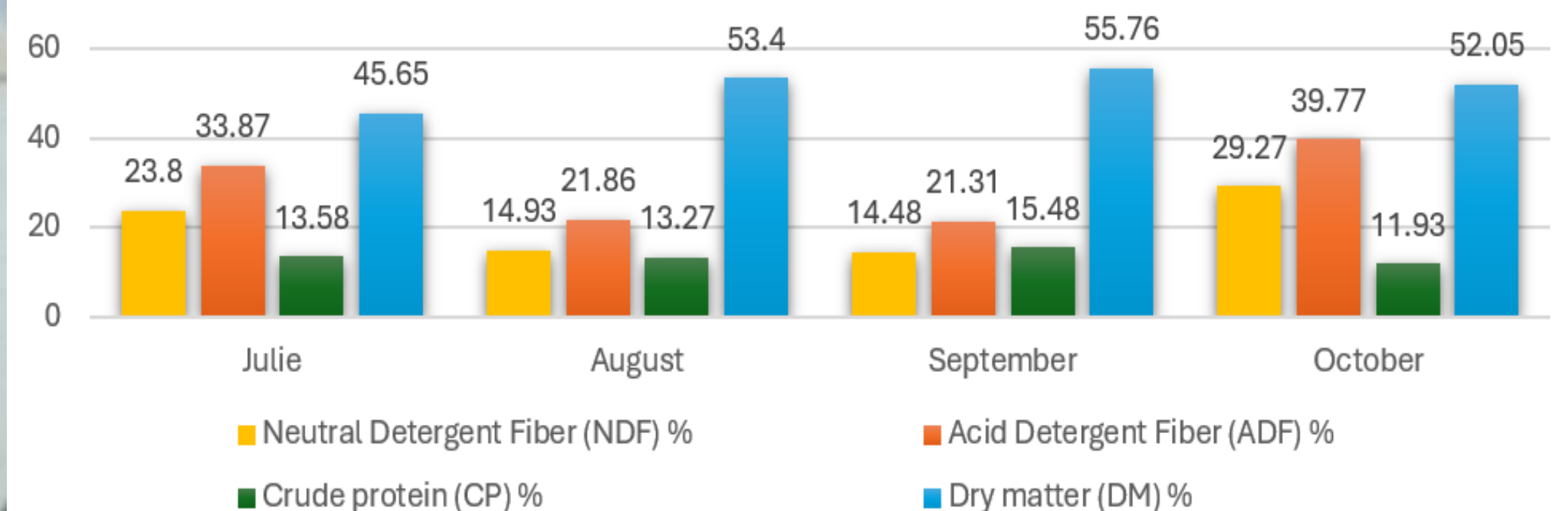
Good nutrition supports reproduction in dairy cows by promoting follicular growth, ovulation, and hormone synthesis. Energy or protein deficiency disrupts the hypothalamic–pituitary–ovarian axis, reducing LH secretion and follicular development. In this study, COD incidence rose from 6.48% in July to a peak of 15.5% in September, then declined to 3.82% in October.

Incidence of ovarian cysts



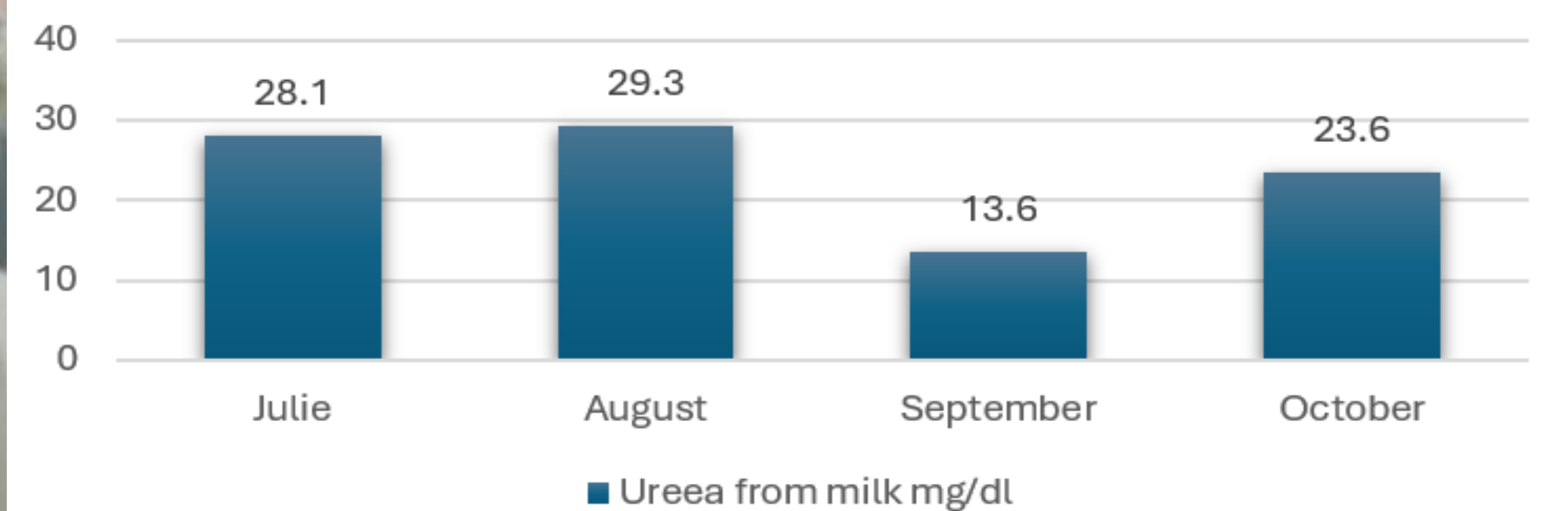
Ration composition varied notably during the study. Fiber (ADF/NDF) was high in July, dropped sharply in August–September, then increased in October. Low fiber reduced rumination and energy availability for hormone synthesis. In September, high dry matter (55.76%) further limited feed intake, while low milk urea nitrogen (13.6 mg/dL) indicated poor protein-energy balance, contributing to impaired follicular and hormonal function.

Feed analysis



These nutritional imbalances triggered **negative energy balance (NEB)** lowering glucose, insulin, and IGF-I levels, which **impaired LH secretion, progesterone synthesis, and follicular development**. Together, these effects promoted ovarian cyst formation during periods of poor fiber and energy–protein balance.

Ureaa from milk mg/dl



Conclusions: Cystic ovarian disease (COD) is a key reproductive disorder in high-producing dairy cows, leading to reduced fertility and longer calving intervals. This study demonstrates that low fiber and protein intake, combined with high dry matter and energy deficits, induce negative energy balance (NEB), disrupting metabolic and hormonal regulation (glucose, insulin, IGF-I, LH, leptin) and promoting cyst formation. Proper nutritional management—balanced energy–protein ratios, adequate fiber, and monitoring of metabolizable protein and milk urea nitrogen—is essential to maintain hormonal balance and prevent COD in dairy herds.

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